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GROWTH RESPONSE OF EAST SIDE PINE POLES TO REMOVAL OF LOW VEGETATION

By

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ABSTRACT: Different components of understory vegetation were removed beneath isolated pine poles in the east side ponderosa-Jeffrey pine type. In this experiment the pines grew faster when perennial bunchgrass was destroyed than when bunchgrass plus broad-leaved shrubs or broad-leaved shrubs alone were eliminated.

What is the competitive effect of various kinds of low vegetation on the growth rate of ponderosa and Jeffrey pine? A study begun in 1955[1/] was designed to learn something of the growth reaction of pine poles to removal of: (a) perennial bunchgrass and sedge, (b) broad-leaved plants (principally sagebrush (Artemisia tridentata Nutt.) and bitterbrush (Purshia tridentata (Pursh) DC.)), and (c) both grass and broad-leaved plants.

The area chosen for the study was a powerline right-of-way near the Blacks Mountain Experimental Forest in northeastern California. All large overstory trees had been removed from the area some 20 years previously. A number of isolated poles were present. Their only possible competition was a fairly dense ground cover of low vegetation.

1/ This work was under the direction of William E. Hallin.

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The study consisted of nine replications of randomized blocks with four trees within each block. The 12- by 12-foot areas around the trees in a block were treated differently. These treatments were:

1. Control.
2. Spraying 2,4-D (to kill broad-leaved plants).
3. Spraying Dalapon (to kill grass and sedge).
4. Spraying a mixture of 2,4-D and Dalapon.

Diameters and heights of trees were measured in 1955 and at the end of five growing seasons. Effects of the treatments were examined each year. No respraying was considered necessary in 1956 or 1957. By 1958 enough low vegetation had invaded treated areas to warrant removal of appropriate species by hoeing to maintain the original treatments, and sprays were reapplied in 1959 and 1960 for the same reason. In all cases, rates of application equaled or exceeded rates suggested by a manufacturer's representative.

Reseeding from surrounding plants made necessary repeated treatments on the experimental areas. The numbers and sizes of plants becoming established in any year were small. Plant invasion would have been even less important if seed sources of the low vegetation had been killed on much larger areas.

Results

Initial mean basal area and 5-year mean basal area increment per tree, by treatments, were:

Treatment	Initial basal area	Basal area increment
	- - - - Square feet - - - - -	
Control	.110	.093
Grass removed	.153	.129
Broad leaves removed	.114	.101
All vegetation removed	.098	.114

A statistical analysis (F test) of the 5-year basal area increment revealed that differences between treatments were significant at the .01 level. To learn which treatments were significantly different from each other, treatment means were compared (table 1). We concluded that combinations of all low vegetation in this experiment adversely affected growth of the pines, and that perennial grass had a greater effect than the broad-leaved plants.

Discussion

Since the east side pine type lies in a region of low rainfall, competition among plants for available soil moisture is intense. Removal of understory plants, therefore, can increase moisture available for growth of pines. Whether the growth response of pine poles obtained by eliminating low vegetation in the east side type would be economically

justified may be questioned for several reasons. The required frequency and cost of treatment on larger areas needs further investigation. Then, too, treatment of areas larger than the 12- by 12-foot squares might influence the results.

Table 1.--Differences in basal area growth between treatments during a 5-year period

Treatment	Grass removed	Broad leaves removed	All vegetation removed
		Square feet	
Control	.0366**	.0082	.0212*
Grass removed	--	.0284**	.0154
Broad leaves removed	--	--	.0130

* Significant difference.
** Highly significant difference.

Perhaps the most significant lead from the experiment is that we should question proposals for wide spacings in plantations and thinnings in the east side pine type. We should consider that anticipated growth rates of pines may be adversely affected by invasions of low vegetation.

Another important observation was that chemical treatment of the low vegetation caused no visible injury to the trees.